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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,264	09/10/2003	Bernardino M. Penetrante	IL-10564B	5065

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EXAMINER

NGUYEN, TU MINH

ART UNIT PAPER NUMBER

3748

DATE MAILED: 07/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

88

Office Action Summary

Application No.

10/660,264

Applicant(s)

PENETRANTE ET AL.

Examiner

Tu M. Nguyen

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20030910</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claims 8 and 18 are objected to because the claims are identical to claims 7 and 17, respectively; therefore, claims 8 and 18 should be canceled in response to this Office Action.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balmer et al. (U.S. Patent Application 2002/0014071) in view of Vogtlin et al. (U.S. Patent 5,711,147).

Re claims 1 and 2, as shown in Figure 2A, Balmer et al. disclose an apparatus comprising a catalytic converter, the apparatus comprising:

- an oxygen rich engine-exhaust gas inlet (100);
- a reductive stage convert of NO_x (202) connected to receive a mixture of NO_x and unburned hydrocarbon from the engine-exhaust gas inlet, the convert comprising an alkali metal

Art Unit: 3748

cation-exchanged faujasite-type zeolite catalyst (see paragraphs 0050 and 0051) that further serves to convert NO_x to gases that include nitrogen, carbon dioxide, and water steam; and

- a plasma converter (200) upstream of the catalyst adapted for converting at least a portion of the NO_x to NO₂.

Balmer et al., however, fail to disclose that the apparatus further comprises a diesel fuel inlet to inject a hydrocarbon fuel into the engine-exhaust gas.

As shown in Figure 3, Vogtlin et al. also disclose a plasma-assisted catalytic storage reduction system comprising an upstream plasma reactor (74) and a reductive state converter of NO_x (78). Vogtlin et al. teach that the reduction system is applied to a diesel engine that is operated mostly with a lean air-fuel ratio. Because of this, they teach that the system further comprises a diesel fuel inlet (54) to inject a hydrocarbon fuel into an exhaust gas stream for the effective reduction of NO_x to nitrogen. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have modified the apparatus of Balmer et al. to include a diesel fuel inlet as taught by Vogtlin et al. and applied the apparatus to a diesel engine, since the use thereof would have provided an effective means to reduce harmful NO_x emission in such diesel engine.

Re claim 3, in the modified apparatus of Balmer et al., the zeolite comprises an X-zeolite or Y-zeolite (see paragraph 0051).

Re claim 6, in the modified apparatus of Balmer et al., the zeolite comprises a pore size greater than about 6.5 angstroms (see paragraph 0050).

Re claims 7 and 8, in the apparatus of Balmer et al., the zeolite comprises a silicon/aluminum ratio in the range of about 1 to about 3.

Art Unit: 3748

4. Claims 1-3, 6-10, 13, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vogtlin et al. in view of Balmer et al.

Re claims 1 and 9, as shown in Figures 1 and 3, Vogtlin et al. disclose an apparatus and a vehicle with reduced NO_x engine exhaust emissions, comprising:

- a fuel supply of diesel fuel (12);
- an internal combustion engine (14) operably connected to receive a major portion of the fuel supply of diesel fuel and to propel a vehicle, and having an oxygen-rich exhaust comprising NO_x;
- a first reactor (78) operably connected to receive pulsed inletted minor portions of the fuel supply of diesel fuel (54), the first reactor comprising a catalyst that further comprises an alkali metal (potassium) cation-exchanged zeolite for NO_x reduction gas treatment and wherein the first reactor is further operably connected to receive the oxygen-rich exhaust comprising NO_x, and operably connected to output therefrom a product comprising nitrogen that has been converted from the NO_x and noncombusted hydrocarbons from the diesel fuel; and
- a second reactor (82) for collection and combustion of the noncombusted hydrocarbons connected to receive the product of the first reactor with the NO_x and connected to receive the noncombusted hydrocarbons, and operably connected to output a second exhaust with reduced NO_x emissions.

Vogtlin et al., however, fail to disclose that the zeolite is a faujasite-type.

As shown in Figure 2A, Balmer et al. also disclose an apparatus for the catalytic plasma reduction of NO_x in an exhaust gas stream, comprising a plasma reactor (200) and a reductive stage converter of NO_x (202). Balmer et al. teach that the converter comprises an alkali metal

Art Unit: 3748

cation-exchanged faujasite-type zeolite catalyst (see paragraphs 0050 and 0051) adapted to effectively convert NO_x to nitrogen. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the faujasite-type zeolite catalyst taught by Balmer et al. in the apparatus and vehicle of Vogtlin et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively convert harmful NO_x emission into nitrogen gas.

Re claims 2 and 13, the modified apparatus and vehicle of Vogtlin et al. further comprising a plasma converter (74) upstream of the catalyst adapted for converting at least a portion of the NO_x to NO₂.

Re claims 3 and 10, in the modified apparatus and vehicle of Vogtlin et al., the zeolite comprises an X-zeolite or Y-zeolite (see paragraph 0051 of Balmer et al.).

Re claims 6 and 16, in the modified apparatus and vehicle of Vogtlin et al., the zeolite comprises a pore size greater than about 6.5 angstroms (see paragraph 0050 of Balmer et al.).

Re claims 7, 8, 17, and 18, in the modified apparatus and vehicle of Vogtlin et al., the zeolite comprises a silicon/aluminum ratio in the range of about 1 to about 3.

5. Claims 4-5 and 11, 12, 14, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vogtlin et al. in view of Balmer et al. as applied to claims 1 and 9, respectively, above, and further in view of legal precedent.

Re claims 4, 5, 14, and 15, the apparatus and vehicle of Vogtlin et al. disclose the invention as cited above, however, fail to disclose that the zeolite comprises a pore volume above about 0.20 ml/gram.

Vogtlin et al. or Balmer et al. disclose the claimed invention except for specifying an optimum pore volume for the zeolite above about 0.20 ml/gram. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of pore volume of the zeolite, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claims 11-12, the modified vehicle of Vogtlin et al. discloses the invention as cited above, however, fails to disclose that the first reactor is adapted to receive the minor portion of the fuel supply in an amount less than 10% of the fuel supply of a diesel fuel requirement that initially produces the diesel engine exhaust prior to the injecting.

Vogtlin et al. disclose the claimed invention except for specifying an optimum amount of diesel fuel injected into the exhaust gas stream less than 10% of the diesel fuel supplied to the engine. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of diesel fuel to the exhaust, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Prior Art

6. The IDS (PTO-1449) filed on September 10, 2003 has been considered. An initialized copy is attached hereto.

Art Unit: 3748

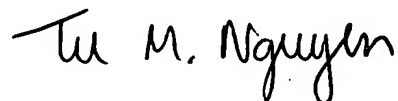
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of five patents: Hoard (U.S. Patent 5,746,984), Balko et al. (U.S. Patent 6,176,078), Broer et al. (U.S. Patent 6,247,303), Labarge et al. (U.S. Patent 6,887,438), and Nakanishi et al. (U.S. Patent 7,043,902) further disclose a state of the art.

Communication

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TMN

June 27, 2006

Tu M. Nguyen

Primary Examiner

Art Unit 3748